# What the US Needs Now: Pertussis Boosters

## Not Just for Some, but for Everyone

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Authors and Disclosures

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Hi. My name is Paul Offit. I am speaking to you today from the Vaccination Education Center at Children's Hospital of Philadelphia. It is July 27, 2012, and I would like to talk about an article that appeared recently in *Morbidity and Mortality Weekly Report* [1] discussing an outbreak of pertussis (whooping cough) that has occurred in Washington State.



As of today, 3000 cases of pertussis have been reported in Washington State. Although there have been no deaths, this is the biggest outbreak seen there in 50 years. It is just a microcosm of what has been going on in the country because 18 states are in the midst of epidemics of pertussis. We have had a total of approximately18,000 cases of pertussis this year, including 9 deaths, and we are only halfway through the year. This could be one of the biggest outbreaks of pertussis we have had in decades.

So, the question is, why? To understand that, we need to go back to the beginning. The original pertussis vaccine was developed by Pearl Kendrick and Grace Eldering in the 1930s. It came into widespread use by the early 1940s. Kendrick and Eldering made the original vaccine by growing *Bordetella pertussis* in media. They then treated it with formaldehyde, and basically this produced inactivated pertussis toxins (otherwise known as toxoids) as well as structural and nonstructural proteins of the bacteria.

There were about 3000 immunologic components in that vaccine, counting bacterial proteins as well as bacterial polysaccharides, with toxins being considered bacterial protein. It was a highly immunogenic vaccine. Pertussis is a disease that killed more children in the 1940s than did polio, measles, and tuberculosis combined. In the United States, pertussis killed as many as 8000 children every year. With the advent of the vaccine, we saw a dramatic decline in the incidence of pertussis.

In 1997, we switched from the whole bacterial vaccine to the acellular vaccine. We took advantage of advances in protein chemistry and protein purification to make a purer and safer vaccine, because the whole-cell vaccine had a difficult side-effect profile. Episodes of seizures, including seizures with fever, were not infrequent. There was high fever and persistent and inconsolable crying. There was hypotonic hyporesponsive syndrome, which was dramatically reduced by the advent of the acellular vaccine. We are now about 15 years into that vaccine.

However, the acellular vaccine is less effective. To some extent, we have traded efficacy for safety. We are now finding out just how big a trade that was. When you look at the outbreak in Washington State, you can see

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that waning immunity is a significant reason that we are seeing these outbreaks.

What should we do? There are 2 ways of looking at this. One is to know that the most effective weapon we have to prevent pertussis is still the pertussis vaccine and especially the Tdap [tetanus, diphtheria, pertussis] component given as a booster to older adolescents and adults. If you look at who dies of pertussis, it is young infants -- children less than a few months of age. They are not going to be protected by pertussis vaccine anyway. The best way for them to be protected is by immunizing their mothers.

Mothers are recommended to receive the Tdap vaccine either in the late second trimester or the third trimester of pregnancy. However, many mothers don't get that vaccine. The second recommendation is to make sure that adults living in the home or older children living in the home have received a Tdap booster.

With the outbreak that occurred in California in 2010, people were 8 times less likely to get pertussis if they had received the Tdap vaccine than if they hadn't. Similarly, the Tdap vaccine lessens the degree of illness, even though it may still develop. People are much less likely to get moderate-to-severe disease if they have been vaccinated.

Current immunization rates in adults are about 8%. *That is woeful.* The best thing we can do right now is to make sure that everyone who is living in a home with young children is vaccinated, especially adults. Thank you.

References